Nov. 18, 1924. **1,516,272**

A. F. FIFIELD

TENSION RELEASING MECHANISM FOR SEWING MACHINES

Original Filed May 1, 1919 2 Sheets-Sheet 1

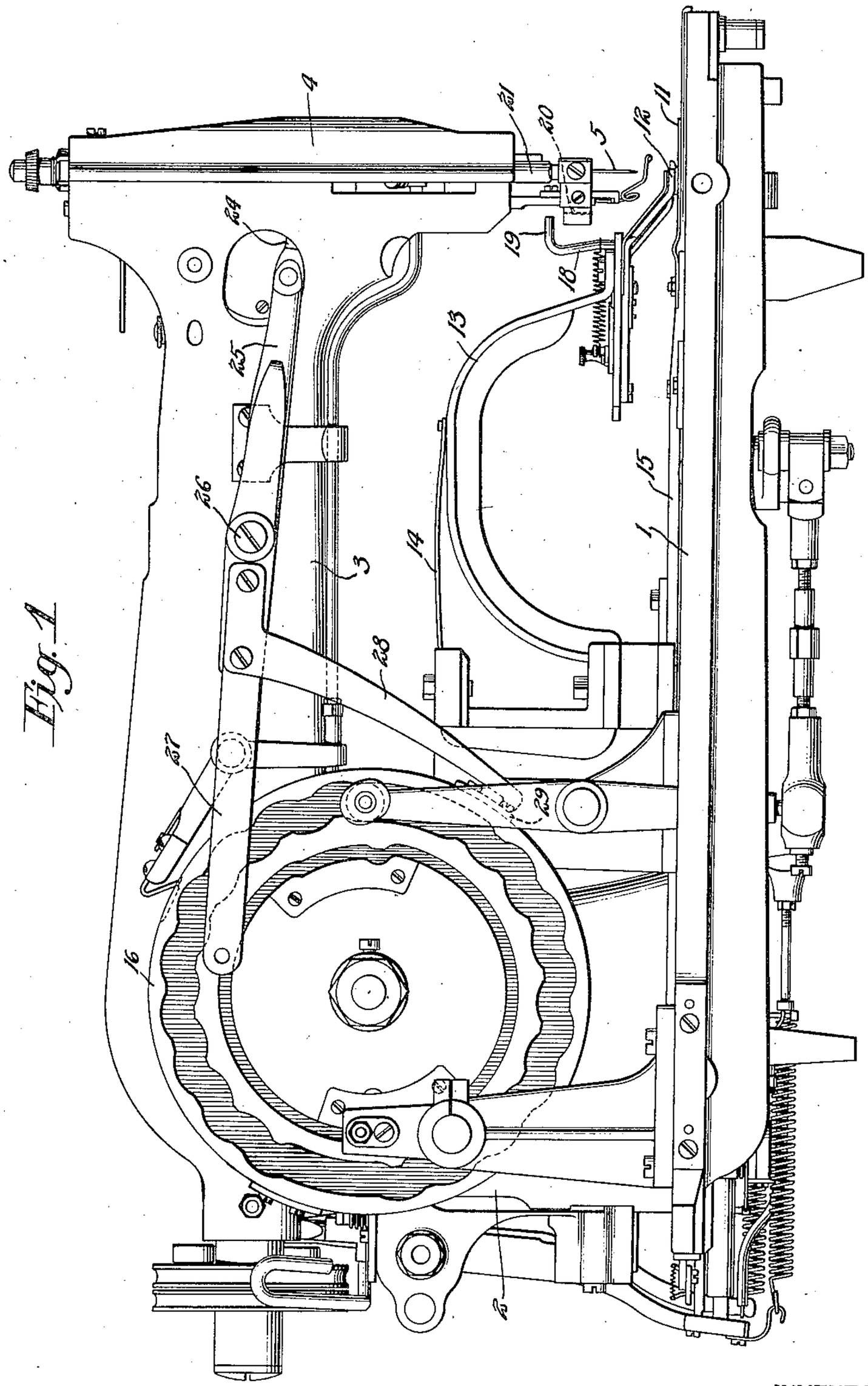

Fig. 1

WITNESSES

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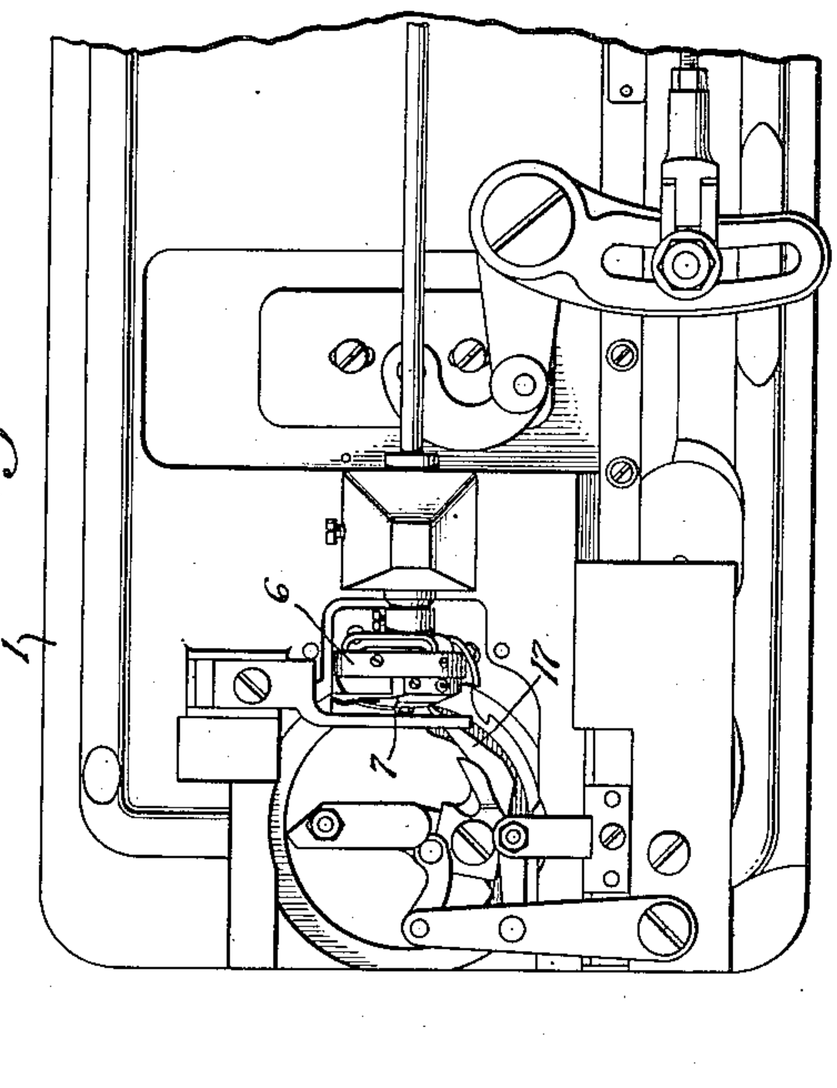

Fig. 3

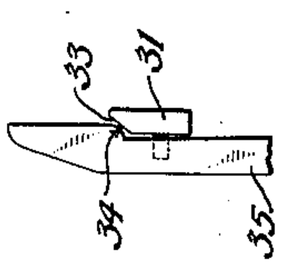

Fig. 4

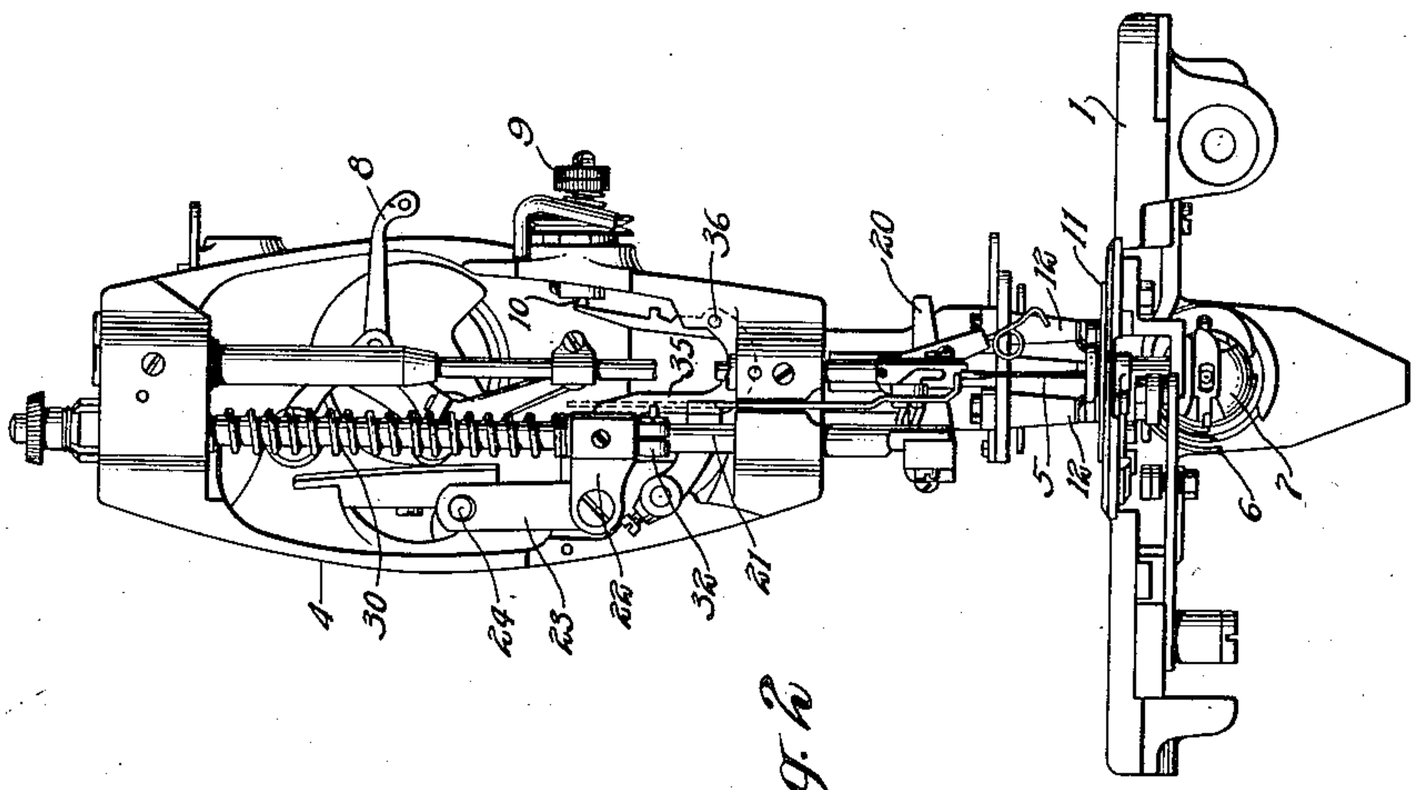

Fig. 2

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UNITED STATES PATENT OFFICE.

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TENSION-RELEASING MECHANISM FOR SEWING MACHINES.

Original application filed May 1, 1919, Serial No. 294,034. Patent No. 1,447,941, dated Marc.. , 1923.
Divided and this application filed February 20, 1923. Serial No. 620,175.

To all whom it may concern:

Be it known that I, ALBERT F. FIFIELD, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Tension-Releasing Mechanisms for Sewing Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to sewing machines of the type adapted to sew a group of a predetermined number of stitches and then automatically come to rest. Machines of this type are customarily used for tacking, barring, sewing on buttons and similar operations, and have heretofore been operated at the relatively low speed of 1000 to 1200 stitches per minute. Such machines are customarily fitted with an automatic means for cutting the sewing thread so that when the machine is brought to rest the work may be removed without attention to the sewing thread.

In my copending application Serial No. 294,034, filed May 1, 1919, of which this application is a division, there is disclosed a high speed machine (1500 to 1800 R. P. M.) for sewing on buttons, tacking, etc. This machine is equipped with a stop-motion device and automatic thread-cutting mechanism including an implement for detaining the last needle-loop below the work prior to severing such loop. The stitch-forming mechanism of this machine comprises a reciprocating needle and a rotary hook making two rotations for one reciprocation of the needle; necessitating the use of a take-up operating to take up the needle-loop in about one-half the time required by the take-up of a shuttle machine. If, then, a rotary hook machine is operated at 50% higher speed than a shuttle machine, it follows that the take-up stroke of the former is executed at three times the speed of the take-up stroke of the latter.

Where, as in the present machine, rotary hook stitch-forming mechanism is combined with a thread-cutter having a needle-loop detaining implement around which the last needle-loop is tightened by the take-up, it will be appreciated that a sudden and severe strain will be imposed upon the needle-thread if it is running under normal tension when the last needle-loop is being tightened around the loop-detaining blade. In prior machines of the type represented in the patent to C. M. Horton, No. 807,676, of December 19, 1905, which operate at a slower speed and embody an oscillating shuttle instead of a rotary hook, the strain on the needle-thread is not severe when the last needle-loop is tightened around the loop detaining blade of the thread-cutter, and the thread can be run under normal sewing tension at all times. In any lock-stitch machine, however devised to operate at a high speed, there is danger of breakage of the needle-thread under the strain imposed by the take-up when the last needle-loop is arrested about the loop-detaining implement of a thread-cutting mechanism.

An object of the present invention is to provide thread controlling means for a high speed sewing machine which will obviate the danger of thread breakage during the action of the take-up in tightening the last needle-loop around the loop detaining blade of the thread-cutter.

A further object of the invention is to provide a combined manual and automatic tension release for the needle-thread.

A further object of the invention is to provide a machine of the button sewing type with an automatic tension release of simple construction necessitating the addition of a minimum number of parts.

With the above and other objects in view, as will hereinafter appear, the invention contemplates the provision of a tension releasing connection which is operated through an element of the usual manually operated clamp opening mechanism common to button sewing machines. To this end, the clamp opening lever has fixed thereto an arm extending into the path of a cam on the usual clamp shifting feed wheel. This cam is designed to give a slight clamp-opening impulse to the clamp opening lever as the take-up executes its final up stroke. There is a slight lost motion connection between the clamp opening lever and the work-clamp so that the impulse given such lever by the feed-wheel is not sufficient to disturb the work-clamp. This impulse is however sufficient to release the tension device

which is connected to be operated by the clamp opening mechanism.

In the accompanying drawings, Fig. 1 is a rear side elevation of a machine embodying the invention. Fig. 2 is a front end view of the machine with the needle-bar and take-up cover plate removed. Fig. 3 is a fragmentary bottom plan view of the machine and Fig. 4 is a detail of the tension release mechanism.

Referring to the drawings, the numeral 1 represents the machine bed from which rises the standard 2 carrying the overhanging arm 3 and head 4. The stitch-forming mechanism preferably comprises the reciprocating needle 5 and loop-taker in the form of a rotary hook 6 which makes two revolutions to one complete reciprocation of the needle. Within the field of action of the rotary hook 6 is supported the usual bobbin 7. The take-up is shown at 8 and is of the well known link type represented in the patent to Diehl, No. 462,398, of November 3, 1891. The tension device is shown at 9 and is provided with the usual tension release push-pin 10.

The work-clamp is of well known form and comprises the lower work-supporting plate 11 and upper separable button-clamping jaws 12. The button clamp is supported by a pivotally mounted arched arm 13 and the latter is spring-pressed downwardly by the leaf-spring 14. The lower plate 11 and arched arm 13 are both carried by the bar 15 which is moved longitudinally and laterally over the bed 1 by the usual connections with the feed-cam 16 to group the stitches according to the desired arrangement.

The machine is equipped with automatic thread-cutting mechanism preferably such as disclosed in my said copending application. This thread-cutting mechanism comprises a needle-loop detaining and severing blade 17 which is projected into the last needle-loop acted upon by the take-up; such loop being tightened around the blade 17 by the take-up before the blade 17 acts to sever one limb of such loop.

The button-clamp carries a lifting post 18 having its upper end 19 bent forwardly to overhang the arm 20 of a bracket secured to the lower end of the clamp-lifting bar 21 journaled in the head 4 alongside the needle-bar.

Fixed to the bar 21 is a lateral arm 22 having an upward extension 23 through the apertured upper end of which projects the pin 24 at the forward end of the arm 25 of the clamp-lifting lever pivoted at 26 to the bracket-arm 3. The arm 27 of the clamp-lifting lever is manually operated and may be connected by a chain to the usual treadle or knee-shift. Fixed to the arm 27 is an automatically operated arm 28, the extremity of which is engaged by the cam-block 29 secured to the periphery of the feed-cam 16. A spring 30 serves to return the bar 21 to its lowermost position and to hold the extremity of the lever-arm 28 in engagement with the periphery of the feed-cam 16.

A rearwardly projecting arm 31 is secured to the clamp-lifting bar 21 by a split collar 32, the rear end of the arm 31 having an inclined cam-surface 33 adapted to engage a cam-surface 34, on the edge of one arm of a U-shaped lever 35 pivoted in the head 4 at 36. The other arm of the U-shaped lever engages the tension release push-pin 10.

Sufficient lost motion is provided between the arm 20 and lateral extension 19 of the post 18 so that the cam-block 29 may shift the follower arm 28 and raise the clamp-lifting bar 21 and arm 31 sufficiently to release the tension device 9 without lifting the button-clamp. When the machine has come to rest, the operator may further manually lift the bar 21 to lift the button-clamping jaws and release the work. The timing is such that as the take-up rises to tighten the loop on the detainer, the lever-arm 28 rides on the cam-plate 29, thereby releasing the tension as the take-up pulls thread from the supply in reaching top position. The tension is automatically restored at the beginning of the new sewing operation as the cam 29 passes the end of the lever-arm 28.

Having thus set forth the nature of the invention, what I claim herein is:—

1. In a sewing machine, the combination with a take-up, a tension device, a stop-motion mechanism, and automatic thread-cutting mechanism including means for detaining the last formed needle-thread loop, of automatically operated means for opening the tension device at substantially the time the take-up is tightening said last needle-thread loop about the loop-detaining means.

2. In a sewing machine of the character described for producing a group of stitches of predetermined design, in combination, a reciprocating needle, a take-up, a thread-tension device, automatic thread-severing mechanism including a detainer for the last formed needle-thread loop, a stop-motion device, and automatic means for releasing the tension device as the take-up is performing its last up stroke and before it reaches top position, whereby the take-up may freely pull thread from the supply through the released tension device in reaching top position.

3. In a sewing machine, a thread-tension device, a work-clamp, a manually operated element and connections for releasing the tension device and subsequently opening the

work-clamp, and automatic means for moving said manually operated element sufficiently to release the tension device without opening the work-clamp.

4. A sewing machine having, in combination, stitch-forming mechanism including a reciprocating needle and a rotary hook making a plurality of rotations for one reciprocation of the needle, a work-clamp, means for relatively moving them to sew a group of stitches, a take-up, a tension device, automatic thread cutting mechanism including means for detaining the last needle-loop acted upon by the take-up, and automatic means for releasing the tension device when the take-up is tightening the last needle-loop about the loop detaining means.

In testimony whereof, I have signed my name to this specification.

ALBERT F. FIFIELD.